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BY

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ON GUAIACOL APPLIED EXTERNALLY AS AN ANTIPYRETIC.

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SCIOLLA* was the first to point out that guaiacol, when applied to the skin, acted as a powerful antipyretic. He used this remedy especially in tuberculous cases and found that two to ten grammes of guaiacol painted upon the skin of the limbs, back, or abdomen (the parts being then covered with gauze or gutta percha) produced a reduction of temperature in fifteen minutes, the patient tasting the remedy. The first traces of guaiacol were noted in the urine in one hour, the largest quantities in from four to six hours. The temperature fell in four to six hours from 2° to 3° C. and then gradually rose. He obtained the same results in various other febrile diseases. Pure guaiacol never produces any inflammatory condition of the skin.

* Sciolla. *Cron. d. Clin. Med. di Genova*, 1892-'93, i, 171-176
also *Semaine médical*, 1893, No. 21.

He was soon followed by Bard and Lannois,* who confirmed Sciolla's statements. The treatment, according to Lannois, is suitable for cases of tuberculosis except those in which there are cavities in the lungs. The drug was rubbed over the chest, back, or thigh, the part being afterward covered with a dressing.

Robillard † also confirmed the statements of Sciolla concerning the antipyretic action of guaiacol when applied externally.

Cassovice and Sigalea ‡ applied the drug in combination with tincture of iodine (one part of guaiacol to five parts of the tincture of iodine) in the treatment of pleurisy. This was painted over large surfaces of the thorax in the evening. A fall of temperature, profuse perspiration, and an increased flow of urine followed; complete resorption of the pleuritic effusion resulted.

Guinard, # after making numerous experiments concerning the effect of the local application of this drug, concludes that the fall of temperature is due to an effect upon the heat center in the brain produced reflexly through the peripheral nerve terminations, and to a slight degree to the inhalation of the vapor of the drug. The effect is more marked in febrile than in non-febrile conditions.

Stolzenburg, || who made similar observations with this drug, finds that the fall of temperature lasts five to eight hours.

A chilly sensation or chill is frequently produced and

* Lannois. *Lyon médical*, 1893, lxxiii, 459-464.

† Robillard. *Compt. rend. de la Soc. de biol.*, Paris, 1893, 9 S. V 716; also *Gaz. méd. de Paris*, 1893, 85, ii, 433-435.

‡ Cassovice and Sigalea. *Semaine médical*, No. 52, 1893.

Guinard. *Province méd.*, Lyon, 1893, vii, 325-328, and *Bullet. gén. de thérap.*, 1893, 402, 1 liv., p. 339.

|| Stolzenburg. *Berliner klinische Wochenschrift*, 1894, No. 5.

sometimes collapse. The initial dose should never be above two cubic centimetres.

Quite recently Da Costa * reports his experience in the use of this drug. He finds that marked reduction of temperature is produced when guaiacol is simply painted over the skin with or without friction. In a case of typhoid fever the temperature fell from 105.4° F. to 98.6° F. in three hours and a half. The reduction of temperature is rather slow, but is not accompanied by any disturbance of the nervous system; a chill was noted in but one case. There was no increase in debility; no delirium; no depression or sign of collapse. In a case of pneumonia the striking effect of guaiacol upon the temperature was not so manifest as in typhoid fever, though the temperature did fall two degrees. The special advantage of guaiacol is its use in typhoid fever when the cold bath can not be applied. While the reduction of temperature following the application of guaiacol is slower than after the bath, the effect is more permanent. As regards the dose, Da Costa believes that the maximum should not be over fifty drops, and so large an amount should rarely be used. Thirty drops is the average dose. After washing the parts with soap and water the guaiacol is applied and rubbed in slowly.

Our experience with guaiacol is based upon its use in seventeen cases. In all, the skin of the abdomen was washed with soap and water, the parts were dried, and the drug was rubbed in for fifteen minutes and covered. There were eight cases of pneumonia, two cases of typhoid fever, two cases of pulmonary tuberculosis, one case of malarial fever, two cases of influenza, one case of rheumatism, and one case of erysipelas.

CASE I. *Pneumonia*.—S. C., aged thirty-five years, admitted into hospital February 6, 1894; taken ill on February 2d; had

* Da Costa. *Medical News*, January 27, 1894.

no chill, but felt badly and had fever and suffered with cough and pain in the chest. The examination showed consolidation of upper lobe of left lung. The temperature was 102° F.; at 3 p. m. it rose to 103.6° F.; at 3.30 p. m. to 103.4° F.; thirty drops of guaiacol were applied and the temperature fell gradually to 100.4° F. at 4.30 p. m.; it rose, however, at 5 p. m. to 101° and at 6 p. m. to 104°, when thirty drops of guaiacol were again applied, and the temperature gradually fell to 100° F. at 8 a. m. the next morning (February 7th). After this it never rose above 102° F. until February 11th; at 6.45 p. m. the temperature was 104° F.; thirty drops of guaiacol were again applied and the temperature fell to 100° at 8.30 p. m.; at 10 p. m. it was again 103°, but fell from this time on of its own accord. The application of the guaiacol in this case produced profuse diaphoresis; no chill or chilly sensations were noted. Great exhaustion was experienced by the patient at the time of the fall of temperature. It is interesting to note that the temperature of this patient never became normal, and that he has since developed tuberculosis in the same lung in which he had pneumonia.

CASE II. *Pneumonia*.—W. F., aged twenty-eight years, admitted February 26, 1894; had a severe chill two days before admission into hospital; also had pain in the chest and fever. On examination, the right lower lobe was found consolidated. Temperature, 103° F., which soon ran up to 105° F. at 4 p. m. Thirty drops of guaiacol were applied, and the temperature fell to 103° F. at 5 p. m., but was again up to 105° at 6 p. m. A bath was given, and the temperature fell to 101° at 8.30 p. m., but was again 104° at 9. p. m. and 105° at 10 p. m. The temperature fell the next morning (February 27th), but at 3 p. m. of this day was 105° F. Thirty drops of guaiacol were applied, and the temperature fell gradually to 101° at 5.15 p. m., but at 7 p. m. was again 103.8° and at 9 p. m. 104° F.

Chilly sensations, profuse perspirations, and great depression and weakness were noted when the temperature had been reduced by means of guaiacol. The bath, which seemed to have reduced the temperature in this case quite as well as guaiacol, did not produce any depression.

CASE III. *Pneumonia*.—W. R., aged thirty-two years, admitted February 27, 1894; had a marked chill two days prior to his admission; also fever, cough, and pain in his chest.

The two upper lobes of the right lung and the upper lobe of the left lung were found consolidated. Temperature at 3 p. m. 104.2° F. Thirty drops of guaiacol were applied, and the temperature gradually fell to 100.6° at 5.30 p. m., but was 106° at 7 p. m. A cold bath was given, and the temperature fell to 102° at 7.30 p. m., but was 104° at 11 p. m. At 3 p. m. on the following day (February 28th) the temperature was 104° F., but was reduced by a bath to 101.4° at 4 p. m. It ran up gradually to 104° again at 11 p. m. At 3 p. m. on the 1st of March the temperature was 104.6°, and at 3.30 104.4°. Thirty drops of guaiacol were applied, and the temperature gradually fell to 100.4° at 6.15 p. m. At 8 a. m. the next morning it was but 102° F. Chilly sensations were noted in this case after the use of guaiacol; also profuse sweating and depression. The guaiacol reduced the temperature more gradually and lower than the bath, but the bath produced less depression.

CASE IV. *Pneumonia*.—M. G., aged thirty-three years, admitted March 7, 1894; had a severe chill on March 5th, followed by high fever. On examination, consolidation of the lower lobe of the right lung was noted. At 10.15 a. m., March 8th, the temperature was 104°. Thirty drops of guaiacol were applied, and the temperature fell gradually to 101° at 12 noon. At 1 p. m. the temperature was again 104°. At 11.45, March 9th, the temperature was 104°. Thirty drops of guaiacol were applied, and the temperature fell gradually to 102° F. at 1 p. m., but rose to 104.4° at 3 p. m., whereupon a bath was given, and the temperature fell to 101.4° and did not rise again above 103° F. In this case no chilly sensation or depression was noted after the application of guaiacol. Profuse perspiration was, however, produced by the drug.

CASE V. *Pneumonia*.—J. C., aged thirty-six years, admitted March 9, 1894. Patient had a chill just before entering the hospital. He complained of fever, cough, and pain in his chest.

On March 10th consolidation of the lower lobes of the right

and left lung was noted. On this day, at 8 A. M., the temperature was 105° ; at 8.30, 104° . Thirty drops of guaiacol were applied, and the temperature fell to 102° at 9.30, but was again 104° at 11 A. M. A bath was given, and the temperature fell to 101.6° at 12 noon, but at 3 P. M. was again 104° , and another bath was given. The temperature fell gradually, and never became high again. The guaiacol did not produce a chill or chilly sensations in this case, but marked depression was noted; no depression was caused by the use of the bath.

CASE VI. Pneumonia.—J. F., aged thirty-seven years, admitted March 9th; had had a chill on the 7th of March, which was followed by high fever. On examination, the upper lobe of the right lung was found consolidated. On March 10th, at 10 A. M., the temperature was 104.6° . Thirty drops of guaiacol were applied, and the temperature fell gradually to 101.4° at 12 noon, but arose gradually to 103° at 9 P. M. At 8 A. M., March 12th, the temperature was 104° . Thirty drops of guaiacol were again employed, and the temperature fell to 100° at 11 A. M., but was 103° at 3 P. M. This patient felt a chilly sensation after the use of the guaiacol, but no depression. He perspired profusely. Again, on the 13th of March at 3 P. M., his temperature was 104.4° , and a bath was given which reduced his temperature to 101° . The effect produced by the bath was not so marked or pleasant as that produced by guaiacol, and when, on the 14th, it was again necessary to reduce his temperature, he preferred the guaiacol to the bath. The guaiacol reduced the temperature again from 104° to 101° .

CASE VII. Pneumonia.—William M., aged fifty-five, admitted March 10, 1894; had a chill three days before entering hospital, followed by fever and tightness on chest. On examination, the lower and upper lobes of the right lung were found consolidated. At 8 A. M., March 11th, the temperature was 104.2° . Thirty drops of guaiacol were applied, and the temperature fell to 100° at 10 A. M.; it rose to 103° F. at 3 P. M., but after this time fell without the use of any antipyretic. The patient experienced no chill after the application of the guaiacol, but suffered markedly from the profuse diaphoresis produced by the drug.

CASE VIII. *Pneumonia*.—J. D., aged thirty-one years, admitted March 11, 1884. On the morning of admission had a chill followed by fever. Examination on March 12th revealed a consolidation of the apex of the right lung and of the base of the left lung. On this day at 11.30 a. m. the temperature was 103.4°. Thirty drops of guaiacol were applied, and the temperature fell to 102° at 1 p. m., but was again 103° at 2 p. m. On the 13th, at 11 a. m., the temperature was 104°; a bath was given, and the temperature fell to 101° at 11.50 a. m., but rose to 104.6° at 3 p. m. Thirty drops of guaiacol were now applied, and the temperature fell to 101° at 6 p. m., but again rose to 105° at 9 a. m. This temperature was again reduced by a bath. No chill or chilly sensation was noted in this case. After guaiacol had been applied the patient felt weak, and suffered from profuse diaphoresis.

CASE IX. *Typhoid Fever*.—R. S., aged twenty-five years, admitted February 5th; had been previously in good health. Four or five days before admission to the hospital he had suffered from profuse diarrhoea, malaise, and epistaxis. When admitted the patient had profuse diarrhoea (typhoid stools) and tympanites; no special pain or tenderness over the abdomen. On the 6th of February, at 10 a. m., the temperature was 103.6° F.; thirty drops of guaiacol were applied and the temperature fell to 101° at 12 m.; it rose gradually and at 6 p. m. was 104.6°, whereupon thirty drops of guaiacol were again applied; the temperature fell gradually to 102° at 9 p. m. and did not rise until 6.45 p. m. the next day, when the thermometer registered 104°; thirty drops of guaiacol were again applied and the temperature fell once more to 101° F. at 8.30 p. m.

At 8 p. m. on the 8th the temperature was 103.6°; a cold bath was given and the temperature fell to 102.8° at 3 p. m., and did not again rise until the 10th, when, at 9.30 a. m., the temperature was 103.6°; thirty drops of guaiacol were applied at this time and the temperature fell to 100° at 5 p. m., but at 6 p. m. rose to 103°. The application of guaiacol did not produce any marked chill or chilly sensation in this case, but the profuse perspiration which the remedy caused was very exhausting to the patient. The bath which was applied reduced

the temperature as well as the guaiacol without causing the intense exhaustion.

CASE X. *Typhoid Fever*.—R. L., aged twenty-four years, admitted February 11, 1894. Patient had been ill a week before admission into hospital; he had suffered with profuse diarrhoea, feeling of malaise, headache, and fever. On admission the abdomen was found distended and very tender to the touch; the diarrhoea was still profuse. At 1 p. m. the temperature was 104°. Five grains of antipyrine were administered and no reduction of temperature was noted. The temperature was 105° at 4.15 p. m.; thirty drops of guaiacol were applied and the temperature gradually fell to 102° at 6 p. m.; it rose gradually again until 12 at night, reaching 104°. At 12 o'clock noon the next day the temperature was 105.8°; forty drops of guaiacol were applied and the temperature gradually fell to 101.4° at 3 p. m. At 6 p. m. it was again 105°; a bath was given and the temperature fell to 104° at 6 p. m.; at 7 p. m., the temperature still being 104°, ten grains of antipyrine were administered and the temperature fell to 103.4° at 11 p. m.

On the 13th, at 3 p. m., the temperature rose to 105°; forty drops of guaiacol were again applied and the temperature fell gradually to 100.6° at 6 p. m., but rose to 105° again at 8 p. m. A cold bath was next administered and the temperature fell to 102.6° at 11 p. m., but rose to 104.4° on the following morning at 10.30. Forty drops of guaiacol were now applied and the temperature was reduced to 99° at 2 p. m., but at 4.30 p. m. was again 105°.

In this case guaiacol produced a marked chill and great depression and profuse sweating, and the patient became very weak and exhausted. While the bath did not lower the temperature so markedly as the guaiacol, the effect produced was more stimulating and refreshing and no depression was noted.

CASE XI. *Pulmonary Tuberculosis*.—F. O., aged forty-five years, admitted February 2, 1894. Patient has had cough and night sweats for the past five years; has also expectorated blood at times.

On admission, apices of both lungs were found consolidated.

On February 3d at 6.15 p. m. the temperature was 103.6° F.; thirty drops of guaiacol were applied and the temperature fell gradually to 99.2° at 9 p. m.; it gradually rose, however, during the night, and at 7.30 a. m. the next morning was 103°. The application of guaiacol occasioned such profuse perspiration, marked depression, and weakness that it was not again applied in this case.

CASE XII. *Pulmonary Tuberculosis*.—G. D., admitted February 15, 1894; patient had been ill some time before admission; suffered with cough, expectoration, and night sweats. On examination the entire right pleural cavity was found to contain fluid; this was removed by aspiration and the apex of right lung was found consolidated.

On the 15th, at 6.30 a. m., the temperature was 104° F.; thirty drops of guaiacol were applied, and at 9 p. m. the temperature had fallen to 101.8°, and at 11 p. m. was again 104°.

On the 16th, at 5 p. m., the temperature was 104°; forty drops of guaiacol were applied. At 6 p. m. the temperature was 103°, and at 7 p. m. 104°. Five grains of antipyrine were administered and the temperature fell to 101.4° at 9 p. m., and did not rise again until 12 noon the following day, when the temperature rose to 104°; with five grains of antipyrine the temperature was again lowered to 101° at 2 p. m., but rose to 104° at 11 p. m. At 3.45 p. m. the same day the temperature was 103.4°. Thirty drops of guaiacol were again applied, but the temperature rose to 104° at 5 p. m. In this case, in which guaiacol was applied on three separate occasions, the temperature upon the first occasion was reduced from 104° to 101.8° and quickly rose again to 104°. In the second and third instances the temperature was not reduced at all, while five grains of antipyrine markedly reduced the temperature. Other trials were made with guaiacol upon the same patient, but in no instance were we able to produce any marked reduction of temperature; marked diaphoresis and depression were, however, noted.

CASE XIII. *Malarial Fever*.—J. H., aged forty-six years, admitted March 3, 1894. Has had a chill every second day for

two weeks; suffered with malaise, headache, and pains in the back and loins. Patient had a chill on day of admission; malarial organisms were present in the blood. At 8 p. m. the temperature was 104° F. Fifty drops of guaiacol were applied and the temperature gradually fell to 100.6° at 9 p. m. At 11 p. m. the temperature had again risen to 103°, and five grains of quinine were given at this time and ordered three times daily, and, as the temperature continued to rise to 104°, at 5.15 p. m. fifty drops of guaiacol were again applied and the temperature fell to 101° and did not again rise. The guaiacol did not produce any chilly sensation in this case, but caused profuse diaphoresis and weakness.

CASE XIV. *Influenza*.—E. G., aged thirty-five years, admitted into the hospital March 1, 1894. Patient has had pain in the head and loins and a feeling of malaise for several days. On the day of admission the temperature was 104.6° F. at 9 p. m. Thirty drops of guaiacol were applied, and the temperature gradually fell to 101.4° at 11 p. m. On the second day the temperature had risen to 105.2° at 11.40 a. m. Thirty drops of guaiacol were again applied; the temperature fell to 103° at 1 p. m., but at 3 p. m. had risen to 104.4°; with five grains of antipyrine the temperature was gradually reduced to 101° at 3 a. m. the following morning. The guaiacol applied in this case produced neither a chill nor chilly sensation, but profuse diaphoresis which occasioned great prostration. The temperature was reduced quite as well with the guaiacol as with the acetanilide, and the same prostration and diaphoresis were noted when the antifebrin was employed.

CASE XV. *Influenza*.—M. D., aged thirty-one years, admitted March 8, 1894. Patient had a chill the night before admission; since then has been feeling badly with, pains in his limbs, headache, nausea, and loss of appetite. At 3 p. m. on the 8th the temperature was 104° F.; thirty drops of guaiacol were applied. The temperature fell to 101.6° at 4.30 p. m., but rose gradually to 104° at 6 p. m. Ten grains of antipyrine were administered, which reduced the temperature to 102° at 9 p. m., and it did not again rise.

No chill, chilly sensation, or depression was noted after the

use of guaiacol. The patient felt better after the use of the drug than before it had been applied.

CASE XVI. *Acute Articular Rheumatism*.—W. G., aged thirty-eight years, admitted March 5, 1894. Had severe rheumatic pains in left wrist, knee, and ankle, with swelling of these joints. At 8.15 p. m. on the day of admission the temperature was 104° F.; thirty drops of guaiacol were applied and the temperature fell gradually to 102° at 9 p. m. This case was subsequently cured with salicylate of sodium.

The guaiacol produced marked perspiration, but no chills or chilly sensations were noted. Marked prostration was, however, noted.

CASE XVII. *Facial Erysipelas*.—G. T., aged thirty-five years, admitted into hospital March 16, 1894. The temperature at 4.45 p. m. of the same day was 104.6° F. Thirty drops of guaiacol were applied. At ten the next morning the temperature had only fallen to 103°. Thirty drops of guaiacol were again applied and the temperature gradually fell to 100° at 1 p. m. The patient had no chill or chilly sensation after the use of guaiacol, but felt better; no weakness or prostration was noted.

Case.	Disease.	Average reduction of temperature.	Average time required after application of guaiacol to produce lowest fall of temperature.	Chill or chilly sensation.	Depression.	Diaphoresis.
1	Pneumonia.	3.6°	3 hours.	No.	No.	Profuse.
2	"	2°	1 hour.	Chilly sensation.	Exhaustion.	"
3	"	4.4°	2½ hours.	Chilly sensation.	"	"
4	"	2.5°	1½ "	No.	No.	"
5	"	3°	1 hour.	"	Marked exhaustion.	"
6	"	3.4°	3 hours.	Chilly sensation.	No.	"
7	"	4°	2 "	No.	Yes.	"
8	"	2.2°	1½ "	"	Marked exhaustion.	"
9	Typhoid fever.	2.7°	3½ "	"	Weakness.	"

Case.	Disease.	Average reduction of temperature.	Average time required after application of guaiacol to produced lowest fall of temperature.	Chill or chilly sensation.	Depression.	Diaphoresis.
10	Typhoid fever.	3·6°	3½ hours.	Marked.	Great depression.	Profuse.
11	Pulmonary tuberculosis.	4·2°	2½ "	"	Great depression.	"
12	Pulmonary tuberculosis.	1·2°	1½ "	No.	Yes.	"
13	Malaria.	3·4°	2½ "	"	Yes, marked.	"
14	Influenza.	2·5°	1½ "	"	Marked depression.	"
15	"	3·4°	1½ "	"	No.	"
16	Rheumatism.	2·2°	1½ "	"	"	"
17	Erysipelas.	2°	4 "	"	"	"

From these observations concerning the external application of guaiacol in fever we are justified in concluding :

1. That this drug has a powerful antipyretic action, occasioning a reduction of from one to four degrees of temperature in from one to four hours.
2. That in all cases this reduction of temperature is accompanied by profuse diaphoresis, which may or may not be accompanied by a chill or chilly sensation.
3. That great exhaustion is frequently produced.
4. That the effects may be obtained from comparatively small doses (from thirty to fifty drops), and that great care should therefore be exercised in the use of the drug. The drug should be applied but once or twice daily, and the initial dose should not be above thirty drops.
5. That the effect produced by guaiacol, though more powerful, is the same as is obtained from most of the other antipyretics of the coal-tar series, and that the same care must therefore be exercised as with the other preparations. Its effect differs from the *stimulating* cold bath in being *depressant*.

6. That the main indication for its use is in diseases accompanied by high fever in which the cold bath can not be applied. It may therefore be especially useful in typhoid fever as well as in all other diseases accompanied by high fever in which irritability of the stomach prevents the use of other antipyretics.

NOTE.—Since the foregoing was written an article by Dr. W. S. Thayer on Notes on the Value of Guaiacol Applied Externally as an Antipyretic has appeared (*Medical News*, March 31, 1894). His results agree essentially with those obtained by us.

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A WEEKLY REVIEW OF MEDICINE.

EDITED BY

FRANK P. FOSTER, M. D.

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